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Green economy or coal 'counter-revolution'? Challenges to China's economic reform process

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The so-called 'energy revolution' has been one of the priority reforms in the agenda of President Xi Jinping. It is one part of the deep restructuring of the Chinese economy, and represents a move away from the investment-based model. The slowdown of economic growth and the rising importance of the problem of environmental pollution have led to a redefinition of the role of coal in Chinese economic policy. The share of coal in energy consumption is expected to decrease gradually, and coal-fired power plants are expected to lose importance and give ground to renewable and nuclear energy. This trend is expected to be boosted by the restructuring and reduction of heavy industry which the government intends to carry out. The situation of the Chinese coal sector will also change as a result of the ongoing price reform, which aims to reduce the level of energy intensity and increase the efficiency of the sector's operations by introducing deregulation in the field of electricity distribution and transmission.

The energy sector reform and structural changes in the economy have led to a decrease in the consumption of coal for the first time in many years. However, in contrast to the reforms announced in 2014, the year 2015 did not halt the rapid expansion of the production capacity of coal-fired power plants. Due to the decentralisation of the decision-making process, within twelve months the provincial governments issued permits for the construction of new coal-fired units with a total capacity of 169 GW, which is over three times more than the year before. This rapid increase was a result of efforts by local authorities to stimulate short-term economic growth, and was possible due to ineffective regulations which encouraged energy companies to increase their investment activity. If all the ongoing and planned projects were implemented, the capacity of Chinese coal-fired power plants would almost double, which could put an end to the reform of the Chinese energy sector. In an attempt to stop this 'counter-revolution', in March 2016 the central government carried out a reform to re-centralise the process and halt the construction of coal-fired plants in 15 provinces until 2017.

Developments in the Chinese coal sector have revealed a series of fundamental challenges to the changes in China's economic model. The inert planning system has made it impossible to quickly adjust the number of new power plants to the reduced pace of economic growth, which in effect has led to a power surplus. The decentralisation of the decision-making process has revealed a significant conflict of interest between the central government and the provinces, and the flawed regulations resulted in energy companies allocating resources ineffectively, ultimately causing an investment bubble. When the central government regained control of the situation, it created a series of temporary tools to limit the expansion of the coal sector. However, no systemic reforms necessary to change the economic model were carried out.

Challenges to the Chinese coal sector

The price paid for access to relatively cheap energy generated by burning coal, which has been one of the pillars of China's economic development in the last 30 years, was the deep degradation of the natural environment. The model for stimulating the economy applied after the 2008 economic crisis, which involved major investments in infrastructure and industrial production capacity, has magnified the existing problems and led to an increase in the consumption of coal, from around 3 billion tonnes in 2008 to over 4.2 billion tonnes in 2013[1]. This has translated into increased pollution emissions, and fuelled the debate in China on the negative impact of coal on air quality. In some Chinese cities the concentration of PM 2.5[2] toxic particles began to exceed the World Health Organisation limits by several hundred per cent. This has caused a wave of intense criticism towards the state's environmental policy, as well as towards certain interest groups associated with the industry, for example metallurgical conglomerates and coal-fired plant operators[3]. This criticism has been particularly active on the Chinese internet. Proposals for the construction of new coal-fired units caused massive street protests, for example in the provinces of Guangdong, Hunan and Inner Mongolia. The scale of the pollution and the animated street protests have put the government in Beijing under pressure and forced the Chinese leadership to declare a 'war on pollution'. The transformation towards a 'green economy' has been considered a political priority. It has influenced the shape of the wide-ranging reform of the energy sector announced by the Chinese leadership, because it gave priority to renewable energy sources and nuclear energy.

The second fundamental challenge to the Chinese coal sector involves the slowdown of China's GDP, which President Xi Jinping referred to in 2014 as "the new normal" (*xin changtai).* The exhaustion of the investment-based growth model has brought about the ongoing structural transformation of the Chinese economy, which the Chinese authorities are trying to control and facilitate. The slowdown observed in the construction and industrial production sectors, which account for 72%[4] of electricity consumption, combined with the reduction of production surplus in the steel production industry, which is the main recipient of coal, have caused a slump in demand for coal. Until 2013 the consumption of coal had been growing steadily for over a decade, whereas in 2014 it decreased by 2.9%[5]. 2015 saw an even greater decrease (by 3.7%), which was followed by a 3.3% reduction in the volume of coal produced by the mining sector[6]. Excessive investments combined with the economic slowdown have led to excess production capacity in the Chinese coal mining sector, currently estimated at 5.7 billion tonnes annually[7], of which only around 3.75 billion tonnes was used in 2015.

Departure from the investment-based model, together with the mounting problem of air pollution, has caused a redefinition of the role of coal in the Chinese economy.

The direction of the reforms set by the Chinese government seems to suggest that 2013 saw a historic peak in the production and consumption of coal. Continued decline in the consumption of coal will be facilitated by a government-supported move from the 'old economy', heavy industry and construction investments,

[1] The quoted data take into account a correction of historical data made by China's statistical office in 2015, http://www.theenergycollective.com/hao-tan/2292551/revision-china-s-energy-and-coal-consumption-data-preliminary-analysis

[2] These are particles of a diameter of around 2.5 μm, which are considered to be particularly carcinogenic.

[3] This was the message of a documentary which was published online at the beginning of 2015, entitled *Under the Dome* (Q*iongding zhixia*). It was filmed by a former CCTV reporter. Over a couple of days, it was played around 300 million times before it was censored and removed.

[4] Data for 2015, CNPC Economics & Research Institute.

[5] http://finance.sina.com.cn/money/future/futures-nyzx/20150227/080921604681.shtml

[6] http://www.lwzb.gov.cn/pub/gjtjlwzb/sjyfx/201605/t20160525_2782.html

[7] http://www.ce.cn/xwzx/gnsz/gdxw/201601/12/t20160112_8203711.shtml

towards an economic model based on the less energy-consuming service sector, high technologies and high added-value production.

China's 'energy revolution' gives priority to nuclear and renewable energy, and is also expected to reduce the economy's energy intensity. This limits the potential for the development of the coal energy industry.

Reduction of the present surplus in heavy industry has been one of the main goals of the so-called supply side reform (*gongyingce gaige),* which has been considered an economic policy priority. In line with the plan announced by the government in February 2016[8], China's coal production capacity is to be reduced by 500 million tonnes by 2020[9], as well as by 100–150 million tonnes[10] in the steel production industry, which has been a major coal consumer.

Foundations of China's transformation towards the green economy

Due to the new challenges involving environmental pollution and structural changes in the Chinese economy, reforms of the energy sector have become a priority for the Chinese leadership and President Xi Jinping himself. The main aims of the Chinese 'energy revolution' include reducing the share of fossil fuels in the energy mix and boosting the economy's energy efficiency. In 2014, the goal was set for the share of non-fossil fuels to reach 15% of the country's entire energy consumption by 2020. This would require a series of transformations in the electricity generation sector and a quick development of capacity of hydroelectric, nuclear and solar power stations, as well as for wind farms to generate 708 GW[11] by 2020 (from the present 517 GW)[12]. The increased share of non-fossil fuels in the energy mix is associated with a limitation on the development of China's thermal power generation sector, which at present is based almost exclusively on coal[13]; currently, this generates 74.6% of China's electricity. According to estimates by Greenpeace, for the goals defined for 2020 to be reached, this proportion would have to be reduced to 65-67%[14]. Another aim of China's 'energy revolution' is to reduce the energy intensity of the Chinese economy and increase the efficiency of electricity generation. The setting of an upper limit for total power consumption in China in 2016 was an event without precedent; in 2020 it should not exceed 5 billion tonnes of coal equivalent (the present figure is 4.3 billion)[15]. This decision is intended to encourage investments in energy-efficient technologies. At the same time, it is tantamount to a reduction of the potential for expanding electricity generation capacity. In the context of the energy mix reform, this will affect the coal energy sector to the greatest extent. Due to technological advancement and the short operational record of Chinese coal-fired power plants, the efficiency of power generation by way of burning coal is relatively high in China compared with the global average. Despite this, the Chinese government plans to continue to modernise the sector's production capacity and develop technologies necessary to increase the average efficiency of power generation to reach the proportion of less than 300 grams of coal per one kWh

[8] http://www.gov.cn/zhengce/content/2016-02/05/content_5039686.htm

[9] http://www.bloomberg.com/news/articles/2016-02-05/china-puts-1-billion-tons-of-coal-capacity-on-chopping-block

[10] http://www.gov.cn/zhengce/content/2016-02/04/content_5039353.htm

[11] In line with strategies adopted by the government, this level is to be reached in 2020; http://www.gov.cn/zhengce/content/2014-11/19/content_9222.htm

[12] http://info.zjtcn.com/news/green/2016/0219/619418.html

[13] Chinese statistics exclusively quote figures referring to the total production of electricity by the entire thermal energy sector, including both gas-fired and coal-fired stations. In 2015, the share of gas in China's energy mix was a mere 6%.

[14] http://energydesk.greenpeace.org/2014/12/17/china-coal-peak-iea-missed/

[15] http://energy.people.com.cn/n1/2016/0426/c71661-28303860.html

and reduce the scale of emission of pollutants[16]. As part of the reform intended to boost the efficiency of operations in the coal energy sector, the deregulation of prices of energy generation and transmission is planned. This is intended to improve the allocation of resources and rationalise the investments in this sector, as it is independent of market fluctuations caused by price changes. The government's plans include liberalising the entire supply chain comprising electricity generation, transmission and sale. At present, pilot projects involving the reduction of profit margins applied by transmission companies (for example in Shenzhen) are being implemented. Changes are being introduced as regards the principles of obtaining access to the power grid, which tend to prefer coal over renewable energy sources. The final element of the reform involves the liberalisation of retail energy prices. At present, the prices of electricity transmission and distribution are being set by state agencies.

In 2012, a dual system of setting coal prices was abandoned. Under this system, electricity generating companies had access to cheaper coal, whose price had been set by way of negotiations between the mining sector and the energy production sector under supervision from the state. In previous years, the scope of these agreements had been gradually reduced. Control by the state has recently been discontinued, as a result of which the power generation sector has begun to purchase coal at market prices. This reform was facilitated by low coal prices, which enabled the energy sector to maintain its profitability.

Combating the 'coal counter-revolution'

The turn in the Chinese coal energy sector announced by the Chinese leadership in 2014, which came as a consequence of the 'energy revolution', was combined with the partial decentralisation of the procedure for granting approvals for the construction of new coal-fired units. In October 2014, the National Development and Reform Council (NDRC) delegated the task of approving new projects to its counterparts in specific provinces, whereas in March 2015 a similar change was made regarding the procedure of the Ministry for Environmental Protection issuing environmental permits.

The announced liberalisation of electricity transmission and sale prices is intended to contribute to the improvement of the quality of investments in the Chinese energy sector.

The aim of the reform was to make the procedure more flexible, and to adjust the number of approvals to local environmental situation and to the changes in the demand for electricity. In contrast to expectations, decentralisation has resulted in a significant increase in the number of new coal projects. According to Greenpeace, in 2015 environmental approvals were issued for 169 GW of new capacity, which was a three-fold increase compared with 2014. The NDRC's delegation of competences regarding the issuing of building permits to relevant offices in specific provinces has brought a similar result – the average capacity of projects approved each week increased from 4 GW to 10 GW[17].

If all the coal-fired units which had been submitted for approval in recent years were actually constructed, this would cause a series of developments which would be highly unfavourable for the central government. At the beginning of 2016, around 190 GW of new capacity was already under construction, which means that the completion of all the currently implemented and planned projects would be

[16] http://www.nea.gov.cn/2014-09/28/c_133679621.htm

[17] Over nine months (from January to September 2014) the total capacity of new coal-fired units approved by the central NDRC was slightly above 35 GW (32 approvals). Due to the decentralisation of the decision-making process, over the next 15 months provincial bodies approved the construction of units with up to 151 GW of new capacity (149 approvals). Source: CoalSwarm Global Plant Coal Tracker.

tantamount to a doubling of the capacity of China's coal-fired units, which in turn would put an end to the Chinese 'energy revolution'. In January 2016, the total capacity of all new coal-fired power plants undergoing the approval process was a staggering 515 GW[18].

Decentralisation of the process of issuing approvals for the construction of coal-fired power stations has caused a rapid increase in the number of new projects. Their implementation would put an end to China's policy of 'exit from coal'.

The rapid increase in the number of new projects observed in 2015 was accompanied by an inert planning process and a lengthy procedure for granting approvals. This, in turn, has caused a massive accumulation of projects submitted in previous years which were based on demand forecasts prepared before the period of economic slowdown. The increase in the number of approvals granted in previous years, especially in western provinces, was partly due to the plan to relocate power plants to less densely populated areas[19].

The implementation of planned coal projects would also cause a significant rise in the supply of electricity obtained from coal, which in turn would challenge the profitability of this sector. In a situation of decreased use of the present capacity and insignificant increase in the demand for electricity, investments in new units would cause a continued drop in the utilisation rate of the existing infrastructure and an increased risk of insolvency across the entire energy sector. This problem is all the more urgent because the energy sector is dominated by state-controlled companies which face massive debt. Another negative consequence of the 'counter-revolution' in the Chinese coal energy sector has been the increased risk of street protests; for example in August 2015, around 10,000 people took part in a rally against the construction of a power plant in Heyuan in Guangdong province. Any significant expansion of the capacity would also enable certain interest groups associated with the coal sector to obtain – by *faits accomplis* – strong arguments in favour of saving the sector, most likely to the detriment of renewable and nuclear energy.

At the beginning of 2016, the Chinese authorities decided to curb the energy 'counter-revolution'. In March, the National Development and Reform Council announced a plan to radically limit the construction of coal-fired units, according to the slogan 'suspend, block, delay'[20]. The key element of the plan was the administrative decision to suspend the process of issuing permits for the construction of new units until the end of 2017, and to suspend all projects which have already been approved but whose construction has not yet been launched. The projects which are being implemented are to be delayed. The restrictions cover 15 selected provinces and regions in which an oversupply of electricity has been observed. A decision was also made to create a central control mechanism to make the launch of future projects (including obtaining funds for the investments) dependent on their impact on the environment and the state of water resources, on business profitability and on local demand situation. Central coordination of provincial plans on the development of the energy sector is to be improved, with particular emphasis placed on satisfying demand by developing renewable sources of energy and increasing the efficiency of the present coal-fired units. Another important

[18] The process of granting approvals has several stages: the quoted number of approvals includes announced projects (246 GW), projects with preliminary approval (215 GW) and projects with final approval (54 GW). Considering the fact that in 2010-2015 only 164 GW of projects which were at the preliminary stage of approval were cancelled, it should be expected that most of them will be implemented. Source: CoalSwarm Global Plant Coal Tracker.

[19] This has influenced the geographical distribution of new projects; 50% of new projects were located in western provinces, although at present these provinces account for a mere 28% of the existing capacity.

[20] http://www.ndrc.gov.cn/zcfb/zcfbtz/201604/t20160425_798979.html

point is the development of the network for the transmission of energy from provinces with surplus power to areas in which there is a deficit.

The 'coal counter-revolution' has revealed the divergence in the interests pursued by central bodies and by provincial governments and state-controlled companies.

Chinese leaders have announced a plan to apply 'natural selection' mechanisms to eliminate low-efficiency coal-fired power plants with below 3 GW capacity which have been operating for more than 20–25 years. Due to the central government's determination and the scale of disobedience at the local level, sanctions have been announced regarding coal projects which are being implemented without formal approval. The individuals responsible will be penalised, details of their activity will be publicised and the projects will immediately be suspended – in extreme cases by cutting them off from funding and depriving them of access to the power grid.

Main challenges to China's economic reforms

Developments in the Chinese coal sector have revealed a series of fundamental challenges faced by China's leaders in the process of implementing deep economic reforms. Firstly, the economic slowdown, which translates into a much lower than expected increase in demand for electricity, has revealed the inertia of the Chinese planning system. The unexpected slump has disturbed the course of the planned expansion of the capacity of coal-fired power plants, which had been prepared for many years ahead, leading to a production surplus and a decreased level of infrastructure use. The logic behind the Chinese decentralisation process, which is an important element of the series of reforms, was based on delegating competences to provincial governments so that local knowledge resources could be used to respond better to local needs. However, one of the consequences of decentralising procedures for issuing permits to construct new power plants involves the state losing control of the sector. This was because the process has revealed a major conflict of interests between the central governments and the provinces.

After gaining control of the expansion of the coal sector, the provincial governments did not proceed to implement the centrally-planned energy revolution; instead they began to take advantage of their new competences to temporarily stimulate the sector's operations. This happened mainly in those regions with the biggest share of coal-related sectors in their GDP, for example Shanxi, Xinjiang and Inner Mongolia (around 40% of new capacity). Paradoxically, in part these were the areas which make up the Chinese 'rust belt', and which are the main target of the reforms devised by the government – they were the most affected by the slowdown in the steel production industry and the mining industry and by degradation of the environment. New investments in coal-fired units have become a tool to temporarily stimulate local economies and fight rising unemployment; this came as continuation of the growth model based on major infrastructural investments, which began to be applied after 2009. In some areas, this model has caused a spiral of debt for local governments and companies associated with them; for example, at the beginning of 2016 the Shanxi province, China's main coal producer, announced that as many as 103 of its districts were at risk of becoming insolvent[21]. Activities by local officials can partly be explained by their intention to achieve the highest possible GDP ratios, as this was what the individual promotion of party members within the structures of the Communist Party of China usually depended on.

The investment bubble in the coal energy sector has also revealed the consequences of distor-

[21] http://www.haijiangzx.com/2016/0104/610365.shtml

tions resulting from inefficient market regulation which enabled the producers of coal-based energy to earn outstanding profits. Liberalising coal prices at a moment when they were falling rapidly has significantly reduced the cost of power generation. Combined with the concurrent maintenance of administrative regulation mechanisms regarding electricity prices, this has made Chinese coal-fired power plants exceptionally profitable. The profit margin varies in specific provinces, however; in certain areas the return on capital invested in the construction of new coal-fired power plants was as high as 30%, and in some cases, investment outlays were returned after just three years[22]. This situation has mainly benefited the five biggest state-controlled companies, which together have a 60% market share. It was also facilitated by China's system of granting access to the power grid, which guarantees the opportunity to sell power generated by new units. This is why the sector recorded extraordinary profits, despite the fact that China's annual average utilisation rate of thermal power plants has been on the wane[23]. This means that the newly connected coal-fired units (the total increase in capacity was around 245 GW in 2011-2015[24]) were not fully used; moreover, they generated excess supply which limited the level of exploitation of the existing production capacity.

The example of the coal sector shows that the success of China's economic reforms depends mainly on the central government's ability to control the interest groups which are interested in maintaining the *status quo*. The strong reaction to problems which emerged at the beginning of the process of 'abandoning' coal, combined with evident progress in expanding the production capacity of power plants using renewable energy sources and nuclear power stations, are proof of the central government's determination to maintain the course of China's 'energy revolution'. The actions launched in March 2016, including the centralisation of the process for issuing approvals, seem to offer adequate tools to break the resistance of the local authorities and energy sector companies, even though their nature is temporary. The reform's success will largely depend on whether systemic solutions will be implemented, including ones which would change the system of incentives for local governments, together with mechanisms to compensate for losses resulting from structural economic changes in the most sensitive regions[25] and improve the practice of capital allocation in regulated sectors.

[22] http://www.ftchinese.com/story/001067324?full=y

[23] In 2015, the ratio was a mere 4329 hours, which is around 49%, whereas in 2011 it was over 60%. This data refers to power plants with a capacity of more than 600 MW, http://www.cec.org.cn/yaowenkuaidi/2016-01-29/148607.html

[24] CoalSwarm Global Plant Coal Tracker

[25] The key question involves the risk of structural unemployment which would result from lay-offs in the coal sector. The central government has announced a training programme for employees of closed companies, targeting two million individuals. Attempts are being made to find a systemic solution to the problem, for example in the form of financing training activities from funds obtained from profit margins applied by energy transmission companies.

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